RUNNING HEAD: Teacher efficacy at instructing parents

Teacher Efficacy at Instructing Parents of Toddlers with Autism Spectrum Disorders How to Help Their Child Increase Word Production

Research Thesis

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By

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Abstract

Individuals with Autism Spectrum Disorders (ASD) exhibit characteristic impairments in social communication (DSM-V). There are presently numerous intervention studies that aim to improve social communication skills in young children with ASD, however, a majority of these studies are conducted by highly skilled clinicians. The present study aimed to evaluate the effectiveness of a classroom teacher instructing parents of toddlers with ASD how to help their child increase their spontaneous word production. A pre-post single-case controlled design consisting of three families and one teacher was used. Caregivers were taught to facilitate short, repeatable routines and were videotaped in 10-min intervals interacting with their child in the home setting using toys present in the home. Each individual video was coded in one minute intervals and the presence of the following skills were noted: turn-taking present in the play routine, shared positive affect between the child and parent, whether the child chose the toy being played with at a given time and whether that toy was developmentally appropriate, if the parent produced any one or two word utterances, if the child and parent were engaged in a routine, and whether or not the parent was prompting the child's actions. Results indicate that parents learned some of the measured strategies as a result of the intervention. The findings of this study suggest that teachers can effectively teach caregivers methods to expand their child's communication.

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Introduction

Background on Autism Spectrum Disorders

Autism Spectrum Disorder (ASD) is an overarching term for three developmental disorders, including autism, pervasive developmental disorder-not otherwise specified (PDD-NOS) and Asperger Disorder (Lord, Spence, Moldin, & Rubenstein, 2006). The superordinate term, ASD, is used for classification because these three disorders are thought to share parallel causes and symptoms (Lord et al., 2006). The Diagnostic and Statistical Manual of Mental Disorders (DSM-V) outlines criteria for ASD diagnosis (American Psychiatric Association, 2013). The first of two major criteria for this diagnosis regard social communication as well as social interaction. The deficits can be manifest difficulty with back-and-forth exchange of communication and abnormal eye gestures and body language ("DSM-5 Diagnostic," 2013). The second of two major criteria is the engagement of persons with ASD in characteristic restricted and repetitive behaviors. Examples of this restricted and repetitive behavior include lining up toys and excessive interest in unusual objects ("DSM-5 Diagnostic," 2013). According to the DSM-V, these deficits must be present in early childhood and must limit and impair everyday functioning for a diagnosis of ASD to be made (American Psychiatric Association, 2013).

Based on an estimate from the Centers for Disease Control and Prevention, roughly one in sixty-eight children in the U.S. today are diagnosed with ASD ("CDC: Data & Statistics," 2014). This includes one in forty-two boys and one in one hundred and eighty-nine girls ("CDC: Data & Statistics," 2014). The number of children receiving a diagnosis of ASD has increased tremendously in recent years. For example, in the year 2002, one in one hundred and fifty children received a diagnosis (Baio, 2008). At least in part, this may be due to some of the latest

reports suggesting that a diagnosis of ASD can be made prior to three years of age (Baird, Charman, Cox, Baron-Cohen, Swettenham, Wheelright, & Drew, 2001). For example, the Modified Checklist for Autism in Toddlers (M-CHAT) is one screening tool that is used in the early detection of autism (Robins, Fein, Barton, & Green, 2001). By instructing parents on methods that they can use to observe their child's behavior, screening tools such as the M-CHAT have led to an increase in the early detection of autism (Robins et al., 2001).

The proliferating prevalence of ASD diagnoses has led to numerous research studies being conducted on children with ASD, including in the important area of intervention.

Background on parent training

Of special interest is research designed to teach parents how to intervene with their child with ASD. Parent interventions provide parents with information and teach them skills (Schultz, Schmidt, & Sticher, 2011) they can use to help their child. For example, in some parent interventions, parents learn skills to increase joint attention and functional verbal utterances in their children with autism (e.g. Kasari, Gulsrud, Wong, Kwon, & Locke, 2010, Symon, 2005). Because toddlers spend a majority of time with their parents (Kasari et al., 2010), teaching parents intervention skills to use in the home setting has the potential to lead to more positive gains for their child.

The best method to measure parent fidelity success has been the focus of several recent investigations. These recent studies all point to the importance of treatment fidelity in research, particularly in evidence-based practice (EBP) and response to intervention (RTI) (Schulte, Easton, & Parker, 2009). Treatment fidelity, sometimes referred to as treatment integrity, is defined as an outcome based on what a treatment was intended to measure. Two very important aspects that contribute to high treatment fidelity are identification of targets in intervention, and

identification of dosage (Kadervek & Justice, 2010). It is best practice to identify targets for intervention by following a treatment manual. Dosage measures how often and how long a intervention is conducted. Treatment fidelity can be measured directly or indirectly, but it is best practice to measure fidelity directly if feasible (Kadervek et al., 2010). Kadervek & Justice (2010) explain that with direct fidelity measurement, a practitioner is evaluated by a researcher using a checklist in a live setting or from video-recordings. On the other hand, indirect fidelity requires a practitioner to evaluate themselves using logs, interviews, or self-report scales. Treatment fidelity is explored in the review of literature. Additionally, it is implemented in the present study.

Existing research on parent trainings

Recently, parent training has received increased recognition as a vital early intervention tool for children with ASD (NAC, 2009). Koegel and colleagues noted that instructing parents to teach their children skills, has been shown to increase generalization and maintenance of skills (Koegel, Schreibman, Britten, Burke, & O'Neill, 1982). Additionally, parent training has been praised for its potential to reduce stress levels on parents and families (Koegel & Schreibman, 1996). Parent training empowers parents as they learn advocacy skills and how to successfully interact with their child. Parent training is also a cost effective way to implement intervention. These reasons provide rationale for parent training as a valuable method of early intervention for children with ASD.

A growing body of studies suggests that parent training can be effective for children with ASD (Landa, Holman, O'Neill, & Stuart, 2011) when conducted in an early education setting. Below, parent training studies that address communication skills are reviewed. It should be noted

that caregivers for children are not always parents, therefore, the term *caregiver* training is sometimes used.

Ingersoll and Dvortcsak, (2006) conducted the first study that implemented parent training within the context of an early childhood education curriculum for children with ASD. As a part of the program, parents were taught several skills to use with their child during daily routines, in an effort to expand on their child's social communication. These skills included following the child's lead, responding to communicate attempts from their child, and prompting. At the conclusion of the study, the parents completed a satisfaction survey. All of the parents agreed that the training they took part in led to improvements in their child's communication skills. However, parents were less unanimous in their understanding of the skills they were working on with their child. More parents indicated that they did not fully understand how the skills they were taught could be implemented in the home setting. Ingersoll and Dvortcsak cite this as a limitation of the study, indicating that parents may have had a better understanding of how the skills taught translated in the home setting if the teaching sessions were held in the home, rather than the school. Additionally, the only objective data in the study was obtained from a knowledge quiz that the parents took before and after training. Results from the survey indicated that parent's knowledge increased after training, but results were not consistent among parents.

A similar study, conducted by Symon in 2005, compared the success of parents' teaching skills to their child's other primary caregivers. Other caregivers included non-parent family members or outside personal who were brought into the home in order to aid in the development of a child. Symon's study included three households. The purpose of Symon's study was to determine whether parents could indeed teach their child's other caregiver's intervention skills to

be used in looking after a child with autism and to determine if a child's communication skills improved during the intervention. Following the study, parents used more of the intervention strategies, and caregivers learned to implement the techniques they were shown. All parents mastered the skills (at or above 80% established criterion level) that they were taught during training phase, and they all maintained their use of skills in the home when follow up was conducted one month later (Symon, 2005). The other caregivers in all three households also demonstrated mastery of the skills that they were taught by the parents. Effectiveness of communication skills for children was measured in terms of functional verbal utterances produced during child interactions with their parent and other caregiver. Functional verbal utterances were defined as consisting of a normal volume, orientation of body in direction of play partner or stimulus, with a vocalization appropriate for the situation. All of the children in the study increased their functional verbal utterance average at conclusion at the study. This finding suggests that both parents and caregivers can be taught skills, and successfully implement intervention with their child with ASD.

Comparable conclusions can be drawn from a study conducted by Kasari, Gulsrud, Wong, Kwon, and Locke (2010). In this study, 19 primary caregivers in the immediate treatment group were taught to follow their child's lead in a given play setting, in an effort to increase the presence of joint attention skills in their toddler with ASD (Kasari et al., 2010). Caregiver fidelity was measured by having observers rate the parents' performance on a 4 point scale for each of 18 objectives that focused on parent implementation of intervention strategies and their confidence in using these strategies. Findings revealed that caregivers carried out the intervention with a high degree of fidelity and aided in toddlers development from object focused, to joint attention engagement. More specifically, parents received an average score of

3.37 on a 1-4 Likert scale, measuring eighteen objectives for the parents to implement. Parents primarily followed the lead of their child, and children showed decreased object focused engagement and increased joint attention throughout the intervention.

Gaps in overall literature on interventions for young children with ASD

Although the current literature supports parents' abilities to induce positive change in their child with autism and learn specific intervention strategies, more work must still be done regarding parent training intervention. There are not currently enough head-to-head comparisons of parent training interventions. In an article which assess the efficacy of early intervention programs for children with autism, Connie Kasari states that current treatment programs need to be evaluated and streamlined (Kasari, 2002). Kasari notes that several similarities can be seen across current treatment programs for children with ASD, but that some key differences are also evident. Therefore, we do not know which parents and children will benefit the most from particular types of intervention. Additionally, it is not known whether some interventions are more favorably perceived than other, and exactly how they impact families. It is plausible that some families find intervention stressful to fit into the home setting. In addition, many parent training studies do not measure parent fidelity.

Perhaps most significantly, too few parents of children with ASD participate in parent trainings. There are several factors that may inhibit parents from taking part in a training program. Ingersoll and Dvortcsak state that very few early childhood special education programs that elicit the use of the Early Childhood Special Education (ECSE) curriculum include parent training in the program (Ingersoll et al, 2006). It is both challenging and expensive for families of children with ASD to partake in training. Training sessions for parents often require parents to meet for a scheduled time separate from the school and work day. This can pose a problem in

terms of acquiring child care while the parents attend the training sessions. It is easy for parents to miss a designated training time due to obligations they have in caring for their children. The field of study is in need of low-cost, feasible ways to have parent training reach more families.

The present study was a part of a larger study of a caregiver training intervention striving to increase the production of single spontaneous words from children with ASD. The original study evaluated the effectiveness of the intervention at improving child communication, whereas this paper looks at the intervention's success at improving parent strategy use. The specific aims of the study are as follows:

Aim 1: To determine if the overall average frequency of validated parent strategies increased as a result of the intervention.

Aim 1.1: To determine if the overall average frequency of validated parent strategies increased from the entry to intervention time points.

Aim 1.2: To determine if the overall average frequency of validated parent strategies increased from the entry to follow-up time points.

Aim 2: To determine if the average frequency of specific validated parent strategies increased from the entry to intervention time points.

Aim 2.1: To determine if the Child's Choice of Object strategy increased from the entry to intervention time points.

Aim 2.2: To determine if the Developmentally Appropriate Objects strategy increased from the entry to intervention time points.

Aim 2.3: To determine if the Child-Initiated Routines strategy increased from the entry to intervention time points.

Aim 2.4: To determine if the Parent-Initiated Routines strategy increased from the entry

to intervention time points.

Aim 2.5: To determine if the One-Two Word Utterances strategy increased from the entry to intervention time points.

Aim 2.6: To determine if the Prompting for Communication strategy increased from the entry to intervention time points.

Aim 2.7: To determine if the Shared Positive Affect strategy increased from the entry to intervention time points.

Aim 2.8: To determine if the Turn-Taking strategy increased from the entry to intervention time points.

Methods

Design

The study uses a pre-post single-case controlled design with three participants. This means that data were analyzed before the intervention started and after the intervention began. The targeted parent behavior was strategy use. A one-month follow-up measure was conducted for all subjects.

Participants

Participants for the study were recruited during early autumn of the academic year from an inclusive university center-based program for toddlers with developmental disabilities. The following criteria had to be met for a child to be eligible for the study: (a) a diagnosis of Autism or Autism Spectrum Disorder (ASD) from a clinical psychologist, (b) meet research criteria for Autism or ASD on the Autism Diagnositc Observation System-Generic (ADOS-G: Lord, C., Rutter, M.D., DiLavore, P. & Risi, S., 2001), (c) be under three years of age, (d) be presently attending a certain university center-based school, (e) be a student of a classroom teacher who

was the focal point of the intervention, (f) have no presence of seizures, associated physical disorders, or additional disorders co-occurring with other syndromes or diseases, and (g) have a communication cut-off score of less than seven on the Communication and Symbolic Behavior Scales-Developmental Profile (Wetherby & Prizant, 2002). A parent or caregiver was eligible to take part in the study if he or she was the primary caretaker of the child; defined as spending 15 hours or more with the child each week and being able and willing to attend all intervention sessions. Teacher eligibility was based on the following criteria: (a) they were an employee of the university center-based school, (b) they would continue teaching at the school throughout the duration of the study, (c) they were currently making weekly home visits, and (d) they served as the classroom teacher of all of the eligible children.

The participants for the study, therefore, consisted of three children and three caregivers, with one teacher providing the parent intervention. The teacher had his bachelor's degree in Special Education and held a license to teach both birth-to-three and Pre-Kindergarten to third grade.

Classroom setting

All three participating children in the study were students in the same Early Intervention classroom in a university center-based program located in the Midwest region. All eight children in the classroom had a developmental disability, with the most common being an expressive language delay. The participants in the study made up three of the eight children in this classroom. In addition to the teacher, a physical therapist, speech therapist, and occupational therapist assisted in the classroom on a regular basis. The Infant Toddler Environmental Rating Scale-Revised was used by a school administrator not associated with the study to rate the classroom. The classroom was awarded a strong overall score of 6.7 (Harms & Clifford, 1980),

meaning that the classroom was not only accessible, but the furniture was well arranged, and teachers, as well as children followed proper hygiene routines. This is relevant to the present study because it shows the participating toddlers were educated in a high-quality classroom, which may or may not reflect most classrooms in the community

Procedure

Six major steps were followed in the study: the training of the teacher, recruiting participants for the study, administering entry assessments, conducting the intervention, conducting the exit assessments, and administering the follow-up measures. Following parental consent, one of the experimenters administered a series of assessments to possible participants to determine their eligibility. Next, baseline measures were taken and the beginning of intervention started.

Teacher training

The participating classroom teacher received coaching by the lead author to achieve fidelity on the intervention. This involved his studying the treatment manual (see below for detail) and then receiving feedback as he began practicing implementing the intervention. The principal investigator for the larger study accompanied the teacher to home visits for two months to provide direct coaching to the teacher and to model the intervention with the families for observation by the teacher. Following each session, the principal investigator and teacher discussed the visit. At the conclusion of the two-month teacher training phase, the teacher achieved 90% fidelity based on a pre-determined rubric established by the principal investigator. The teacher continued to meet with the principal investigator every two weeks during the intervention in order to maintain his established fidelity.

Intervention

The present study aims for each child to receive the same intervention and is based on the validated Joint Attention and Symbolic Play and Emotion Regulation intervention (e.g., Lawton & Kasari, 2013). All caregivers were taught to facilitate short and repeatable routines based on the strategies used in JASP/ER. The primary goal behind the intervention is to have caregivers engage in these simple, motivating, turn-taking routines with their child, in an effort to improve the expressive language of the child. The teacher devoted 60% or more of his instructional session with the parents to specific social communication content, with the remainder of the session devoted towards each child's IFSP goals and family priorities.

Caregiver coaching was also manualized (see Appendix 1). Parents were taught three modules or steps as a part of the intervention. The steps aimed to improve each child's engagement, communication, and exploration. Coaching of the parent by the teacher occurred during the intervention, as the parent interacted with their child. Each intervention session consisted of the teacher coaching the parent how to implement the strategies pertaining to the module being worked on at the time as well as addressing other concerns the teacher had. The teacher also encouraged the parent to interact with their child. Toys from the home were used for play, but if not deemed adequate by the teacher, toys were brought into the home from the teacher's preschool classroom. Eventually, the goal was to have the child interact with the parent and/or objects for the entire duration of each intervention session. Parents learned of the importance of implementing the intervention outside of the coaching session with the teacher, and were told to try and implement the intervention on a daily basis, even if just for 15 minutes. No formal data were taken regarding the amount of time parents practiced the intervention outside of the treatment sessions.

In coaching the parent, the teacher used language that was easy to understand. It was acceptable for a parent to ask a question. Throughout each intervention session, the teacher repeated information to the caregiver a few times in order to ensure comprehension. Additionally, multiple times in a session the teacher would point out how strategies the parent was implementing were benefitting the child.

In interacting with the toys, the child was expected to engage in appropriate play behaviors for their developmental level. Through the strategies that the parent learned from the teacher, the child learned sophisticated ways of interacting with a person and/or exploring a toy/object.

Measures: Caregiver-Child Play Interaction

During each home visit, the child and caregiver were videotaped interacting with one another for a ten-minute interval. Caregivers were instructed to play with their child as they typically would. The toys already present in each home were used for play between the caregiver and child. Children were told by the teacher with the video camera that they were simply watching as they played with the array of fun toys. Over time, the video camera was less of a distraction for the children.

Coding

The first author coded every ten-minute video from each of the three households that was collected over a period of 21 weeks. The first author achieved reliability with the principal investigator in using the coding system over a period of a year. Beginning in the summer of 2012, the first author learned the basics of coding and practiced coding by participating as a coder for a variety of studies throughout the school year and into the next summer. Learning the coding system required familiarization with the various skills that can be displayed by both

children and their play partner. The first author attended weekly meetings to enhance her knowledge and ability to code. She began by coding the children in each of the three families for the larger study. The codes for the present study, which centered on the behaviors of the caregivers, were compiled during the summer of 2013. Prior to capturing the codes, a code book was developed for consistency. Overall reliability between the principal investigator and first author was high (82.3%).

A number of strategies were captured with a coding system, evaluating whether or not the parents implemented the targeted skills (Appendix 2). These strategies were drawn from the validated Joint Attention and Symbolic Play and Emotion Regulation intervention (JASP/ER) (e.g., Lawton & Kasari, 2013). Whereas the JASP/ER intervention teaches 20 strategies, the present study uses 8 of the 20 strategies. The presence of prompting, turn-taking, and engagement in a routine were coded as skills. *Prompting* is defined as a skill administered by the caregiver. The caregiver marked the routines and actions of the child, or verbally told the child to say a word, such as "say ball." Prompting was tallied in each 1 minute interval if present for a majority of the interval. *Turn-taking* is defined as the back and forth exchange of an object used for play. Turn-taking was captured in each interval if a minimum of a 4 point exchange occurred currently. For example, if a child and parent were cleaning up blocks by placing them in a container, the taking of turns may occur as child places a block in, parent places a block in, followed by another child turn, then another parent turn. *Child and parent initiated routines* were captured, and differentiated based on whether the child or parent independently performed the first step to a routine. Routines were defined as a predictable script for how the child would interact with an object and person, in which steps occurred in sequence and then were repeated at least once. For example, the child and parent may engage in imaginative play with an object.

This object could be a toy representing a vehicle. The child may begin the routine by pushing the vehicle along the ground. The parent would follow the child's lead by pushing another vehicle, as the child did.

Shared positive affect and the parent's production of *simple utterances* were captured as outcomes. Shared positive affect was defined as smiling that was communicated through verbalizations, eye contact, and/our gestures. If the parent exclaimed "good job" this was deemed sufficient to be categorized as shared positive affect. Simple utterances were deemed to be one to two words in length.

Additionally, the presence or absence of toys in the play scenario, *child's choosing of a toy*, and *developmental appropriateness of the toy* was noted. Toys were deemed developmentally appropriate if the child understood how to use the object.

Results

The overall purpose of this study was to determine if teachers can effectively instruct parents of children with ASD skills to increase their child's word production. Descriptive statistics measures included mean and standard deviation were used to analyze the data collected from coding. The results below first depict the overall strategies used by the dyads throughout the study. Outcomes for each individual measured strategy are then explained. Results suggest that parents utilized more intervention strategies as a result of this treatment.

Overall average frequency

Results suggest that all parents in the three studied dyads used more strategies to promote child language usage at conclusion than the beginning of the intervention. Specifically, all three parents used an average of 3.7 more strategies (*SD=4.3*) after the intervention (see Table 1). Parent 1 used an average of 15.7 strategies (*SD=2.5*) during the baseline phase and an average of

16.4 strategies (*SD=5.9*) during the intervention phase. Parent 2 used an average of 21.1strategies (*SD=5.4*) during the baseline phase and an average of 30.9 strategies (*SD=8.8*) during the intervention phase. Parent 3 used an average of 4.1 strategies (*SD=1.8*) during the baseline phase and an average of 4.7 strategies (*SD= 1.2*) during the intervention phase. Parent 2 showed the greatest increase in the use of strategies from baseline to the end of intervention, but all parents increased in their strategy use to some degree over that timeframe.

Nonetheless, some strategies present during the intervention did not carry over to follow-up. At follow-up, all three parents used an average of 5.3 fewer strategies (*SD=4.0*) than they had at the end of the intervention (see Table 1). Parent 1 used an average 13 strategies during follow-up, while they had used an average of 15.7 strategies (*SD=2.5*) during the baseline phase. Parent 2 used an average of 20 strategies during follow-up, while they had used an average of 21.1 strategies (*SD=5.4*) during the baseline phase. Parent 3 used an average of 3 strategies during follow-up, while they had used an average of 4.1 strategies during the baseline phase. It is perplexing that parents decreased in their use of validated strategies at follow-up in comparison to baseline. Possible explanations for the decreased use of validated strategies by all three of the parents during the follow-up time point are explored in the discussion portion of this study.

Specific strategy use

As each of the eight measured strategies were evaluated, it became clear that some strategies changed as a result of the intervention, while others did not. Parents increased their use of simple, one-two word utterances and their use of prompting from baseline to intervention and at follow-up. In contrast, mixed results were obtained regarding the use of the remaining strategies: child's choice of object, developmentally appropriate objects, shared positive affect, turn-taking, parent-initiated routines, and child-initiated routines. Some dyads decreased their

use of these strategies throughout the study, some dyads increased their use of these strategies throughout the study, and some dyads increased their use of a given strategy in intervention, but then decreased their use of that same strategy at follow-up, and vice versa. Detailed statistics regarding each of the eight strategies is presented below.

One-two word simple utterances

The parents in two of the dyads seemed to be influenced by the intervention in terms of their production of simple, one-two words utterances. This is apparent because they increased in their use of these simple utterances from the baseline phase, to the intervention phase, to follow-up. All three parents increased their use of simple utterances on average 1.8 times (*SD=1.6*) from baseline to intervention. Additionally, all three parents increased their use of simple utterances on average 0.36 times (*SD=0.51*) from intervention to follow up (see Table 1). As seen in Table 2, the parents that were likely influenced by the intervention were in dyad 2 and dyad 3. The parent in dyad 1 did not produce any simple utterances in interacting with his child, but rather spoke in full sentences that were too complex for the developmental level of the child. Therefore, parent 1's production of simple utterances in all three phases was coded as an average of 0 simple utterance productions (*SD=0*) (Table 2).

Prompting

The presence of prompting for communication by the parent is essentially seen in all three dyads throughout the study. These findings suggest that the intervention may have influenced the use of the prompting strategy by parents from the baseline phase, to the intervention phase, to follow-up. All three parents increased their use of the prompting strategy an average of 1.9 times (*SD=0.51*) from baseline to intervention. They also increased their use of the prompting strategy an average of 1.3 times (*SD=1.9*) from intervention to follow-up (see

Table 1). There is a slight decrease in the average use of prompting by dyad 3 from the intervention phase to follow-up. Results from each individual dyad can be seen in Table 2.

Child's choice of objects

Mixed results were obtained from dyads in terms of whether or not the child chose the toy/object to play with in the play sessions across the phases. The children in dyad 1 and dyad 2 did not seem to be influenced by the intervention. It is possible that these children were negatively influenced by the intervention, as the instances in which they chose an object in play decreased throughout the study. All three parents decreased in their allowance of their child to choose an object an average of 1.1 times (*SD=1.3*) from baseline to intervention. All three parents also decreased in their allowance of their child to choose an object an average of 0.92 times from intervention to follow-up (see Table 1). It is plausible that the child's choice of object in dyad 3 was influenced by the intervention, as the number of instances in which the child chose the object to play with increased throughout the study.

Developmentally appropriate objects

Data regarding the use of developmentally appropriate objects is inconclusive. Differences are seen across dyads and from the baseline phase, the intervention phase, and follow-up. On average, all three parents increased in their use of the developmentally appropriate object strategy an average of 1.3 times (*SD=1.4*) from baseline to intervention. Contrastingly, all three parents decreased in their use of the developmentally appropriate object strategy an average of 4.5 times (*SD=1.8*) from intervention to follow-up (see Table 2). Dyad 1 decreased in their use of developmentally appropriate objects throughout the study. Dyad 2 increased in their use appropriate objects during the intervention, but decreased in their use of appropriate objects during the follow-up time point. Dyad 3 increased in their use of developmentally appropriate

objects throughout the study, suggesting that the parent in that dyad was influenced by the intervention. Results from each individual dyad can be seen in Table 2.

Shared positive affect

Although the strategy of shared positive affect was expressed by all children and parents, the strategy did not appear to be overtly influenced by the intervention. In the baseline phase, all child and parent dyads used shared positive affect. On average, all three dyads increased their use of shared positive affect an average of 0.62 times (*SD=1.2*) from baseline to intervention (see Table 1). In the intervention phase, one dyad increased their use of shared positive affect, while the other dyads decreased their use of the strategy. All dyads decreased in their use of the shared positive affect strategy during the follow-up time phase, by an average of 1.9 times (*SD=1.2*) (see Table 1).

Turn-taking

Overall, the strategy of turn taking did not appear to be influenced by the intervention. As seen in Table 1, in the baseline phase all participants were coded as using the strategy of turn-taking about one-time. During the intervention phase, data were similar to the baseline phase. From baseline to intervention, all three parents used the turn-taking strategy an average of 0.01 fewer times (*SD=0.4*). This can be seen in Table 2. A similar pattern was observed in follow-up phase, when all three children did not use the strategy of turn-taking on any occasion. From intervention to follow-up all parents decreased their use of turn-taking an average of 0.18 times (*SD=0.19*) (see Table 1).

Parent-initiated routines

In analyzing data for the presence of parent-initiated routines, data showed no evidence to suggest that the intervention had an impact on parent-initiated routines in this study. Whereas all

dyads increased their use of parent-initiated routines from baseline to intervention on average 0.99 times (*SD=1.4*), they also decreased their use of parent-initiated routines on average 1.4 times (*SD=1.3*) from intervention to follow up (see Table 1). More specifically, dyad 1 and dyad 2 increased in their use of parent-initiated routines throughout the intervention, but decreased in their use of parent-initiated routines at follow-up. Dyad 3 decreased in their use of parent-initiated routines throughout the study.

Child-initiated routines

With regard to the presence of child-initiated routines, there was no evidence to suggest that the intervention had an impact. Findings were similar to those for parent-initiated routines. Where all dyads increased their use of child-initiated routines from baseline to intervention on average 0.18 times (*SD=0.13*), all dyads decreased their use of child-initiated routines on average 0.33 times (*SD=0.11*) from intervention to follow up (see Table 1).

Discussion

Overall strategy use and outcomes

This study examines treatment fidelity and outcomes for one of few autism interventions centered on improving a core social communication skill that is taught to parents of toddlers with ASD by an Early Intervention teacher. Conducting the intervention through home visits was feasible because the teacher was already overseeing weekly home visits. Over the course of the study, the classroom teacher traveled to three homes and worked with each parent and child dyad individually. As a result of the intervention, parents in all three dyads increased in their mean use of strategies from the baseline phase to the intervention phase.

The finding of increased strategy use by parents from the baseline phase to the intervention phase suggests that overall the parents learned to use at least some aspects of the

intervention in ways that were consistent with the therapy goals. Additionally, findings relating to several outcome measures suggest that having a teacher instruct parents on intervention skills is an effective method to improve core communication skills in children with ASD. The most novel outcome of this study is the evidence that teachers can play an important role in parent training.

This study also provides additional support to the multitude of studies that emphasize the importance of parent training. It is promising that parents showed progress in learning the strategies they were taught over a short period of time. This suggests that parents can effectively learn strategies of the intervention, even at a low dosage. It is important that this intervention with a low dosage was successful because it increases the likelihood that a study of this nature can be conducted again. In other words, it implies that a study of similar nature is quite manageable in the real world. Additionally, this proposes that children with ASD can improve their social communication with the help of their parents. Training parents on skills that they can use in the home allows the child to learn outside of the classroom setting. The more focus placed on a skill, such as communication, the more likely growth will be seen in a child.

Analyzing specific strategy use outcomes

Despite overall increase in strategy use during intervention sessions, important differences were noted between strategies both during and after the intervention. The strategies related most closely to verbal communication (i.e., prompting and use of 1 to 2 word sentences) seemed to be implemented more often by parents than strategies less closely related to verbal communication (e.g., developmentally appropriate objects and turn-taking). Strategies related to verbal communication were the primary focus of the classroom teacher conducting the intervention.

Due to the fact that parents increased in their use of some strategies during intervention, but did not carry over these increases to follow-up, it is plausible that the time spent in each home visit that was devoted to parent education on these strategies should have increased. Each intervention session lasted approximately ten minutes. It is likely that longer exposure would lead to increased understanding from the parents. Though it was not feasible in the present study, future studies could be designed to determine whether longer term changes in parent behaviors would have resulted from parent education conducted two or more times a week for durations as short as those used here as well as for slightly longer durations (e.g. 20 minutes out of each hour-long home visit). Additionally, parents would benefit from seeing the teacher interact with the child and observing the strategies they were being taught in practice. This would lead to a greater understanding of strategy use than simply receiving coaching as they interacted with their child.

Use of individual strategies

Verbal strategies (simple one-two word utterances and prompting). The strategies of simple one-two word utterances and prompting were increasingly used by parents throughout the study. More specifically, all three parents increased in their use of prompting from baseline to intervention and baseline to follow-up. It is interesting that the two strategies related most closely to verbal communication from the parent saw the greatest improvement from the intervention. It is plausible that in an effort to increase their child's verbal communication, all three parents used more verbal communication on their end to result in more instances of vocalizations, word approximations, and words from their child. For example, if a child an parent are jointly engaged in a play interaction and a parent is commenting about a toy, a child is more likely to produce a verbalization. Therefore, it is not surprising that parents achieved the greatest fidelity in their implementation of the simple utterances and prompting strategies.

Strategies involving object selection. The strategies of child's choice of objects and developmentally appropriate objects were used in varying degrees by the three parents, and results from the intervention do not point to an overarching conclusion. It is plausible that parents struggled to generalize an understanding of developmentally appropriate objects to toys that were not the primary focus of the session. Developmentally appropriate objects and child's choice of objects were not the primary focus of the teacher; therefore, it is not surprising that parents did not use these strategies to the same extent as verbal strategies. In considering the strategies that were coded for, perhaps developmentally appropriate objects and child's choice of objects should not have been a primary focus of coding system that was used. These higher level strategies may be more beneficial in a study where the children have further developed their communication or where they were addressed more frequently by the teacher.

Shared positive affect. The strategy of shared positive affect was used on some occasion by all parents. It is plausible that this strategy was not elicited very frequently by the parents because teaching this skill was not a primary focus of the classroom teacher leading the intervention. It is likely that if the teacher had placed more focus on the use of this skill in his instruction, then more parents would adopt shared positive affect in play interactions with their child. Additionally, some parents may not have been comfortable displaying shared positive affect. It is also possible that the criteria for achieving this code was too rigid, and did not allow for simple instances of shared positive affect to captured through the coding system.

Turn-taking. The strategy of turn-taking was used on at least one occasion by all dyads, but the strategy did not seem to be influenced by the intervention. It is plausible that the choice of toys used during play interactions did not obviously suggest the opportunity for turn-taking between the dyads. For example, child 3 could frequently be seen playing with a toy car that he

could ride on. This particular toy did not allow for the use of turn-taking between child 3 and their parent. Additionally, the criteria for this strategy may have been coded for too rigidly, as it required the back-and-forth exchange of an object to occur four times. Many coding systems only require a minimum three-point exchange.

Parent and Child-Initiated Routines. The use of parent-initiated and child-initiated routines increased for almost all dyads from baseline to intervention. The exception was with dyad 3, who did show did not show an increase of parent-initiated routines throughout the study. This particular home setting provided more distractions for the child, as there were often other children present during the intervention sessions. This provided distractions for both the child and parent. All dyads decreased in their use of parent-initiated routines and child-initiated routines at follow-up. However, overall there were more parent-initiated routines used child-initiated routines in all dyads. These results suggest that the strategy of initiating routines was learned by parents for the intervention, but did not carry over to follow-up. It may have been difficult for parents to grasp the multitude of play scenarios that could be turned into a routine.

Although it is important to evaluate the effectiveness of this intervention as a whole, it is also important to evaluate each individual dyad. Although all three children in this study were close in age, they were at different developmental stages. Some of the children expressed more verbalizations and were more likely to be jointly engaged with their parent. These differences present in the children likely influenced the use of strategies by the parents. For example, a parent was more likely to use more complex strategies if their child was at a higher developmental level. Likewise, a parent may have used simpler strategies if their child was at a lower developmental level.

Generalizability of the present study

Implementation of an intervention of the kind described here would be most feasible in an early childhood school that is presently conducting home visits. Training the classroom teacher was relatively simple, given that he was already using the strategies he taught parents in his classroom. There was simply a need for the principal investigator to travel with the teacher to each home in order to establish the teacher's fidelity at the onset of the study. This undertaking was manageable for the early childhood education center through which this study was conducted. In fact, as has been discovered in numerous studies in which a trainer teaches family members how to implement an intervention, two levels of fidelity are required: first, the intervention has to be successfully modeled and instilled in the family member; then the family members must implement the intervention as intended based on their learning (Burgio, Corcoron, Lichstein, Nichols, Czaja, Gallagher-Thompson, Bourgeois, Stevens, Ory, & Schulz, 2001).

On the other hand, the intervention studied here would probably not be feasible for a number of schools who do not currently conduct home visits. For schools looking to introduce home visits in their curriculum, a number of things must align. The most important factor is that parents must available on a weekly basis so that a teacher can visit their home. Teachers would also need to the flexibility in their schedule to be able to travel to a variety of homes throughout the week. Furthermore, this study may be hard to generalize to other schools because only one teacher was used to conduct the study. His credentials and ability to grasp the intervention may not be as easily met by other teachers. More studies are needed to better establish the credentials that a classroom teacher needs in order to conduct a study of this nature.

Lastly, this study examined the use of this intervention with children of the toddler-age. Their developmental level varies from children who are older and younger, or more mildly or

more severely affected. The training given to parents in the present study may vary from studies that have different developmental profiles as participants.

Methodological issues

This particular design presented some challenges methodologically. The pre-post design of this study was excellent for evaluating the progress of each dyad individually, but presents some challenges from generalizing this study to a wider range of participants. Due to the fact that this study had three parents, three children, and only one teacher, it cannot be said with certainty that this intervention would work well with other participants or teachers. Furthermore, analysis of the data suggests that too many strategies were focused on with the coding system, and possibly, that better outcomes may have been achieved with fewer strategies.

It can be a challenge to achieve validity with a single-case design. Although single-case research design allows for an intervention to be specifically catered to an individual (Tate, McDonalds, Perdices, Togher, Schultz, & Savage, 2008), this type of design does propose some limitations. Colleagues Tate, McDonalds, Perdices, Togher, Schultz, and Savage explain that there are few to no validated scales that can be used to measure the methodological quality of single-case research design (Tate et al., 2008). If a research design cannot be measured with a validated scale, this in turn decreases the validity of the single-case design. External and internal validity can be affected by single-case design. External validity has to do with the ability of a study to be generalized to the real world (Rassafiani & Sahaf, 2010). When a study elicits the use of a few participants, Rassafiani and Sahaf assert that the external validity can be low. However, they also suggest that repeating the study with varying conditions can help make the study more generalizable to the real world. Internal validity has to do with the results of a study being influenced by intended variables or extraneous variables (Rassafiani et al., 2010). One way to

increase internal validity in a study is to ensure that significant measures are taking during baseline before moving onto the intervention phase.

Implications for future research

Future studies should aim to correct the methodological limitations of this study. For example, they should have more child, family, teacher, and school participants. It would be beneficial to compare the outcomes of child and parent behavior between multiple teachers conducting the intervention, rather than just one. This would help determine what qualifications are needed from teachers to generalize this type of study to more schools. Additionally, future studies could teach parents fewer strategies, in hopes that parents will be able to master all strategies taught because there is less for them to focus on.

This study could be adapted in a variety of ways and introduced in an early childhood education curriculum. As stated earlier, parents may benefit greatly from being able to observe the strategies they are being taught. Parents could watch the interventionist play with the child for a period of time, and then try to model the strategies being used by the interventionist. A way to increase communicative attempts from the children would be to have speech-language pathologists involved in the study. An SLP could travel to the home of each dyad and partake in the intervention sessions by introducing more strategies to elicit communication from the children.

Conclusion

In summary, this study showed that a teacher can effectively teach parents some strategies to be used in play interactions with their child with ASD. Importantly, the social communication of each child with ASD also increased as a result of the training parents received form teacher. This study holds promise for forthcoming research studies centered on classroom

teachers as interventionists, particularly in regards to parent training programs for children with ASD.

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Table 1: *Mean and Standard Deviation of All Strategies Used by Dyads*

	1-2 Word Utterances	Prompting	Child's Choice of Objects	Developmentally Appropriate Objects	Shared Positive Affect	Turn-Taking	Parent-Initiated Routines	Child-Initiated Routines	Sum of All Strategies
	Mean (SD)	*Mean (SD)*	*Mean (SD)*	*Mean (SD)*	*Mean(SD)*	*Mean (SD)*	*Mean (SD)*	*Mean (SD)*	***Mean (SD)***
Baseline → Intervention	1.7 (1.6)	1.9 (0.51)	-1.1 (1.3)	1.3 (1.4)	0.62 (1.2)	-0.01 (0.4)	0.99 (1.4)	0.18 (0.13)	**3.7 (4.3)**
Intervention →Follow-up	0.36 (0.51)	1.3 (1.9)	-0.92 (1.1)	-4.5 (1.8)	-1.9 (1.2)	-0.17 (0.19)	-1.4 (1.3)	-0.33 (0.11)	**-5.3 (4.0)**

**Note: A negative number (-) indicates that strategy use decreased from one phase to the next, while a positive number indicates that strategy use increased from one phase to the next.

Table 2: *The Mean Number of Intervention Strategies Used by Parents during the 10-min Play Interaction*

		Baseline			Intervention			Follow-Up		
		Dyad 1	*Dyad 2*	*Dyad 3*	*Dyad 1*	*Dyad 2*	*Dyad 3*	*Dyad 1*	*Dyad 2*	*Dyad 3*
1-2 Word Utterances	*Mean (SD)*	0 (0)	1 (1.1)	1.6 (2.4)	0 (0)	4.9 (2.8)	3 (2)	0 (--)	6 (--)	3 (--)
Prompting	*Mean (SD)*	0 (0)	6.3 (3.5)	2.3 (2.4)	2.1 (2.3)	7.5 (3.0)	4.7 (1.5)	6 (--)	8 (--)	4 (--)
Child's Choice of Objects	*Mean (SD)*	7.3 (2.5)	2.8 (2.8)	4.9 (3.4)	5.4 (3.8)	0.7 (1.4)	5.7 (4.9)	3 (--)	0 (--)	6 (--)
Developmentally Appropriate Objects	*Mean (SD)*	6.7 (1.5)	7.4 (2.1)	3.6 (3.4)	6.3 (3.2)	8.5 (2.9)	5.7 (4.9)	4 (--)	4 (--)	6 (--)
Shared Positive Affect	*Mean (SD)*	1.7 (2.1)	2.3 (1.3)	0.94 (1.1)	1.5 (1.4)	4.5 (3.1)	0.7 (1.2)	0 (--)	1 (--)	0 (--)
Turn-Taking	*Mean (SD)*	0 (0)	0 (0)	0.6 (1.2)	0.44 (1.1)	0.09 (0.3)	0 (0)	0 (--)	0 (--)	0 (--)
Parent-Initiated Routines	*Mean (SD)*	0 (0)	1.4 (2.4)	0.88 (1.59)	0.63 (0.96)	4.3 (3.0)	0.33 (0.58)	0 (--)	1 (--)	0 (--)
Child-Initiated Routines	*Mean (SD)*	0 (0)	0.13 (0.35)	0.31 (1.0)	0.19 (0.75)	0.45 (1.0)	0.33 (0.58)	0 (--)	0 (--)	0 (--)

Appendix 1

Coaching protocol

Engaging the child and caregiver
-The caregiver interacts with the child using the strategy that is the focus of the intervention -The teacher interacts with the child using the strategy that is the focus of the intervention -The teacher employs several strategies to have the caregiver interact with the child during the session. -The teacher employs several strategies to have the caregiver develop deeper comprehension of the intervention. -If needed, the teacher makes notes of resources that s/he needs to connect the caregiver with (e.g., toys for playing with child; brings books to read to child) -The teacher employs several strategies to help the caregiver understand how and when s/he can use the specified intervention strategies when the teacher is not present (e.g., talks about barriers that might prevent, sets a realistic length of time).

Communicating to the caregiver
-The teacher communicates the 'big ideas' for the intervention session -The teacher uses language that is respectful -The intervention uses language that is easy to understand -The teacher encourages the caregiver to talk and ask questions -The teacher listens to the caregiver -The teacher talks about the content a sufficient amount for the caregiver (at least once per routine) -The teacher helps the caregiver understand the importance of the strategy based upon the caregiver's existing priorities for the child -The teacher communicates information on topics related (or unrelated to the intervention) that the caregiver inquires about for an appropriate duration of time.

Engaging with the child
-Child is encouraged to interact/explore with people and/or objects in a developmentally appropriate way throughout the majority of the session -Child is encouraged to interact/explore with people or objects in a more sophisticated manner

*Adapted from JASP/ER coaching protocols

Appendix 2

Codebook

Strategy	Definition of Strategy
Child's Choice of Object's	If it is clear that child chose what object to play with. If child plays with two objects in a one-minute interval, code what the child uses the longest.
Developmentally Appropriate Objects	Child demonstrates that s/he understands how to use the object for a majority of the time that a child is interacting with the object. Pushing, pulling, throwing, and kicking of an object do not demonstrate comprehension of the object.
Child-Initiated Routines	The dyad establishes a sequence of play events with clearly defined roles for each partner. Child initiated routines occur when the child independently performs the first step of the routine.
Parent-Initiated Routines	The dyad establishes a sequence of play events with clearly defined roles for each partner. Parent initiated routines are when the parent independently performs the first step of the routine.
One-Two Word Utterances	Adult speaks in simple language that is appropriate for the developmental level of the child. In order for an utterance to count, it must be overtly directed to the child. Code not obtained in a one-minute interval if the child and parent are quiet for more than 20 seconds.
Prompting for Communication	Clearly marking routines and actions, and leaving room between utterances so that a child can independently produce a word. Additionally, pauses of anticipation which are gestural, verbal, or modeling in nature.
Shared Positive Affect	Communicating smiling to child through verbalizations, eye contact, or gestures. Saying "good job" or making a positive exclamation is sufficient
Turn-Taking	Back and forth exchange of an object with a four-point minimum exchange where the turns have concurrently. Can also be a parent directly imitating their child's play actions.